

Exercise Sheet 4

Deadline: June 15, 2023 – 04:00 am CEST

Exercise 1 Project „Room Manager with Sun RPC“

As you have experienced in the previous exercise sheet the manual development of the RPC protocol via sockets is cumbersome and error-prone. Hence, the university management decides to switch to a standardized RPC system: *Sun RPC*. Sun RPC is a widely used solution providing a good efficiency and allows for a good integration with the room manager library because its C interface.

Sun RPC

Once again you will find a *git submodule* in the subdirectory 04 of your repository which links the room manager library into the `libsrc` subdirectory. The subdirectory `src` includes a file called `roomman_cli.c` which contains the source of a simple menu program using the API of the `roomman` library. In order to compile it, simply use `make` from the main directory and execute the resulting application `roomman_climenu`.

Your task at hand is to convert this application into a distributed one. Hence, a **server** (`roomman_server`) and a **client** (`roomman_clclient`) using the Sun RPC for communication need to be implemented.

The following steps are required to achieve this goal:

1. Create an RPC **interface specification** `roomman.x` in the `src` subdirectory.
2. Autogenerate the **RPC stubs** `roomman_clnt.c`, `roomman_svc.c`, the header file `roomman.h`, and the **templates** `roomman_server.c` and `roomman_client.c`. In order to do so, you need to call:

```
$ rpcgen -a roomman.x
```
3. Manually adapt the client and server side templates `roomman_server.c` and `roomman_client.c` in a way that the server is calling interface of the `roomman` library and the client offers an interface identical to this interface using the RPC interface.
4. Build the client and server side of the application `roomman_clclient` and `roomman_server` by calling `make all` from the main directory.

Sun RPC Tests

For testing purposes the directory `tests` contains two files `refinput.txt` and `refoutput.txt`. `refinput.txt` contains a recorded sequence of inputs for the menu application and `refoutput.txt` contains the corresponding output from the reference implementation. For running the test you first need to start the server and then feed the reference input via *stdin* into the client:

```
$ ./roomman_server &  
$ cat tests/refinput.txt | ./roomman_cliclient >myoutput.txt
```

The generated output file `myoutput.txt` should look similar to the the reference output. In order to compare the differences, you could use the tools `diff` or `meld`.

Hints

At first, familiarize yourself with SunRPC using a simple example. There are plenty of Sun RPC tutorials in the Internet, like the one at <https://www.cs.rutgers.edu/~pxk/417/notes/rpc/index.html>. Try the demonstrated example in order to get to know the usage of the tools.

- In order to use Sun RPC on you own (private) computer you many need some additional packages. On Debian based systems (like Ubuntu) the packages are called `rpcbind` and `libntirpc-dev`.
- Sun RPC requires the portmap service (cf. the slides from the lecture). Potentially you first need to start this service. Depending on your system it may be called `portmapper`, `rpcbind`, `portmapd` ...